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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/817,334	03/21/2001	James A. Folta	IL-10725	8917

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EXAMINER	
ALLEN, STEPHONE B	
ART UNIT	**PAPER NUMBER**
2878	

DATE MAILED: 12/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/817,334	Applicant(s) FOLTA ET AL.	
	Examiner Stephone B. Allen	Art Unit 2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 September 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 15 September 2003 have been fully considered but they are not persuasive.

Applicant argues that Berman et al. (Berman) does not measure the thickness of the figure-correcting layer. Though not specifically stated as "thickness", Berman does disclose provide contour measurements of the layer (col. 2, lines 7-58). Measuring the contour of a layer is synonymous to measuring the thickness of the layer. Hence, the feature of measuring the "thickness" of the figure-correcting layer is shown in the Berman reference. Therefore, the rejection of the claims over the Berman reference is maintained, and the claims, with Berman as the foundation reference, stand rejected.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

Claims 1,2,5,6,9-11,14-17,19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Berman et al. (Berman).

Regarding claims 1, 2, and 21: Berman discloses a method for correcting the figure of a substrate 1 (Figure 1), comprising measuring the figure of a surface of the substrate 1, attaching a figure-correcting layer 7 to a surface of the substrate 1a (Figure 2), locally adjusting the thickness of the figure-correcting layer (through the use of

radiation source 2, test apparatus3, controller 6, and computer 5, Figure 1), and measuring the thickness (contour) of the figure-correcting layer 7. As shown by Figure 3, after adjustment, the thickness of correcting layer 7a is changed, due to the polymerization of the section 7b forming the desired residual figure. Berman iterates between the steps of locally adjusting the thickness of the figure-correcting layer 7 and measuring the thickness of the figure-correcting layer 7 until a desired figure is obtained (col. 2, lines 2-38 and 54-58). The figure of the surface is measured prior to the step of applying a figure-correcting layer (col. 2, lines 11-17).

Regarding claims 5 and 11: In Berman, the step of measuring the figure of the substrate 1 is carried out with a phase shifting diffraction interferometer (col. 2, lines 18-24).

Regarding claims 6 and 15: The thickness of the figure-correcting layer 7 of Berman is known, and the step of locally adjusting the thickness of the figure-correcting layer comprises adding material to the figure-adjusting layer 7 (col. 4, lines 52-68 and Figure 3).

Regarding claims 9 and 10: In Berman, the step of locally adjusting the thickness of the figure-correcting layer 7 is carried out with an electromagnetic beam (from source 2), comprising light in any of the visible light, UV light, and x-ray light ranges (col.2, lines 7-10, 39-41, and 59-64).

Regarding claims 14: In Berman, the thickness of figure-correcting layer 7 is compared to the figure of the surface of the substrate 1 to determine the figure of the substrate in combination with the figure-correcting layer 7 (col. 2, lines 23-37).

Regarding claims 16: The step of locally adjusting the thickness of the figure-correcting layer 7 of Berman comprises removing material from the figure-adjusting layer (col. 2, lines 54-58).

Regarding claims 17: In the process disclosed by Berman, the step of locally adjusting the thickness of the figure-correcting layer 7 comprises adding and removing material to and from the figure-correcting layer 7. As shown by Figures 2 and 3, a chemically altered portion is created from the interface of layers 1a and 7, which effectively change the thickness of both layers, and following this step, unwanted sections 7a are removed.

Regarding claims 19: The step of measuring the thickness of the figure-correcting layer is carried out at a plurality of points simultaneously (col. 2, lines 17-37).

Claim Rejections - 35 USC § 103

Claims 3, 7, 18, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berman et al. (Berman).

Regarding claims 3 and 7: Berman does not specifically disclose the exact index of refraction of the figure-correcting layer 7, and therefore this layer is not expressly taught as being nearly the same as or different from the index of refraction of the substrate 1. However, it would have been obvious to use a material having an index of refraction that is conducive to allowing radiation from source 2 to chemically alter (col. 1, lines 30-40) desired portions of the interface section of layer 7, thereby adjusting the figure of substrates 1. Further, it has been held to be within the general skill of a worker

in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

Regarding claims 18: Berman does not specifically teach employing a polishing tool in the step in locally adjusting the thickness of the figure-correcting layer. However, utilizing polishing tools and mechanical pressure is well known in the art (col. 1, lines 4-23), and it would have been obvious to one having ordinary skill in the art to use a polishing tool or other means of expediting and supplementing the dissolving/removal of unwanted portions 7a of the figure-correcting layer 7, such that the resulting optical means has a flaw-free surface and ideal figure.

Regarding claims 20: In the disclosure of Berman, "an interference picture 4 of the surface is obtained which indicates the surface asymmetries and irregularities on the blank 1" (col. 2, lines 20-23). While the use of two-dimensional detector is not expressly stated, it would have been obvious to one having ordinary skill in the art to use a two-dimensional detector, such as a CCD camera, to obtain these pictures.

Regarding claims 22: While Berman does not specifically teach measuring the figure of the surface of the substrate 1 after the step of applying a figure-correcting layer is carried out, it would have been obvious to one having ordinary skill in the art to configure test apparatus 3, in conjunction with computer 5 and controller 6, to obtain pictures (e.g. interference pictures 4) for measurement, after applying the figure-correcting layer and/or after adjusting the thickness of the layer and removing the unwanted sections to ensure that the application of the layer was successfully done and

to make certain that (after removal of the unwanted portions) figure adjustment has been made and that the optical component is ideally shaped and free of surface flaws.

Claims 4, 8 and 23-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berman, in view of Geullich.

Regarding claims 4 and 23: Berman discloses a method for correcting the figure of a substrate 1 (figure 1), comprising measuring the figure of a surface of the substrate 1, attaching a figure-correcting layer 7 to a surface of the substrate 1a (figure 2), locally adjusting the thickness of the figure-correcting layer (through the use of radiation source 2, test apparatus 3, controller 6, and computer 5, Figure 1), and measuring the thickness of the figure-correcting layer 7. In the disclosure of Berman, an interface is inherently created where the substrate layer 1a and figure-correcting layer 7 meet (col. 2, lines 52-53). Therefore, the figure-correcting layer 7 is attached to the interface, but Berman does not specifically teach the use of a separate interface layer or marker layer, attached to a surface of the substrate 1a, and wherein the figure-correcting layer 7 is attached to the interface/marker layer. However, it is well known in the art to provide such a configuration. Geullich shows in Figure 3 a process of making optical devices that comprises providing a figure-correcting layer 3 on top of an interface layer 2, the interface layer being attached to the optical substrate 1. The interface layer 2 can consist of multiple layers itself (col. 2, lines 16-20); when the figure-correcting layer is exposed to light, the desired insoluble figure section is left on top of the substrate 1, and unwanted portions of this layer can then be dissolved away (col. 2, lines 34-53). It

would have been obvious to one having ordinary skill in the art at the time the invention was made to provide an interface/marker layer between the substrate 1a and figure-correcting layer 7 of Berman, since this is well-known in the art, and to aid in the adhesion and formation of the figure-correcting layers to yield an ideal shape of the substrate for accurate optical performance of the finished component.

Regarding claims 8: The figure-correcting layer 7 of Berman is not expressly taught as comprising an optical material selected from the group consisting of Al, Cr, Co, Ni, Ti, Mo, and Si. However, it is well known in the art to use silver and copper in these layers, as taught by Guellich (col. 2, lines 7-15). It therefore would have been obvious to utilize one of these materials in the figure-correcting layer 7 of Berman, and further since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

Regarding claims 24: The figure of the surface 1 is measured prior to the step of applying a figure-correcting layer (col. 2, lines 11-17).

Regarding claims 25: The thickness of the figure-correcting layer 7 is measured and known (col. 4, lines 52-680.

Regarding claims 26: Berman iterates between the steps of locally adjusting the thickness of the figure-correcting layer 7 and measuring the thickness of the figure-correcting layer 7 until a desired figure is obtained (col. 2, lines 7-38 and 54-58).

Regarding claims 27 and 28: Berman does not specifically disclose the exact index of refraction of the figure-correcting layer 7, and therefore this layer is not

expressly taught as being nearly the same as or different from the index of refraction of the substrate 1. However, it would have been obvious to use a material having an index of refraction that is conducive to allowing radiation form source to chemically alter (col. 1, lines 30-40) desired portions of the interface section of layer 7, thereby adjusting the figure of substrates 1. Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

Regarding claims 29: The step of locally adjusting the thickness of the figure-correcting layer 7 is carried out with an electromagnetic beam (from source 2, col.2, lines 7-10, 39-41, and 59-64).

Regarding claim 30: The step of measuring the thickness of the figure-correcting layer is carried out with interferometry (col. 2, lines 17-22).

Regarding claims 31: In Berman, the thickness of figure-correcting layer 7 is compared to the figure of the surface of the substrate 1 to determine the figure of the substrate in combination with the figure-correcting layer 7 (col. 2, lines 23-37).

Regarding claims 32: In the process disclosed by Berman, the step of locally adjusting the thickness of the figure-correcting layer 7 comprises adding and removing material to and from the figure-correcting layer 7. As shown by Figures 2 and 3, a chemically altered portion is created from the interface of layers 1a and 7, which effectively change the thickness of both layers, and following this step, unwanted sections 7a are removed.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Berman, in view of Katzir et al. (Katzir).

Berman does not specifically teach measuring the thickness of the figure-correcting layer by fluorescence (or by an optical method selected from the group consisting of interferometry, optical reflectance spectroscopy, ultrasound reflectance spectrometry, and fluorescence measurement). However, it is well known in the art to implement fluorescence measuring for such a purpose. Katzir discloses a method for monitoring etching of resists by monitoring the fluorescence of the unetched material, and shows in figure 2 a substrate covered by an organic material 18, doped with fluorescence, disposed beneath a layer of SiO_2 20 and a photoresist layer 22. "During the reactive ion etching of layer 20, in the CHF_3 plasma, the intensity of the fluorescence emitted by the planarizing layer 18 remains constant. But as soon as the detected fluorescence is first observed to substantially decrease ... the ectching of the SiO_2 layer is halted. Thus, over-etching of the SiO_2 layer 20, and undesirable excessive etching of the upper, high resolution resist layer 22, is avoided" (col. 4, lines 55-65). It would have been obvious to one having ordinary skill in the art to have used fluorescence to measure the thickness of the figure-correcting layer 7 of Berman. This layer could have been doped with fluorescent material, as could upper layers of the substrate 1, in order to detect and prevent overstripping of the figure layers.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Berman, in view of Ju et al. (Ju).

Berman does not specifically teach measuring the thickness of the figure-correcting layer through the use of ultrasound. However, it is well known in the art to implement ultrasound in the processing and analysis of substrate figures. Figures 1A and 1B of Ju discloses a conventional configuration of bonded semiconductor substrates. "Methods for observing the non-contact regions of the pair of (such) semiconductor substrates include using an IR image (infrared image), using ultrasound microscopy, using x-ray topography and using a magic mirror" (col. 1, lines 24-27). It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ ultrasound in measuring the thickness of the figure-correcting layer of the disclosure of Berman, in order to monitor thickness of the figure-correcting layer of the disclosure of Berman, in order to monitor thickness of the substrate figure layers "simply and easily" (Ju, col. 1, line 34).

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephone B. Allen whose telephone number is (703) 308-4828. The examiner can normally be reached on Mon-Thurs from 0900-1700. Effective 21 January, examiner may be reached on (571) 272-2434.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (703) 308-4852. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Stephone B. Allen
Primary Examiner
Art Unit 2878

sba